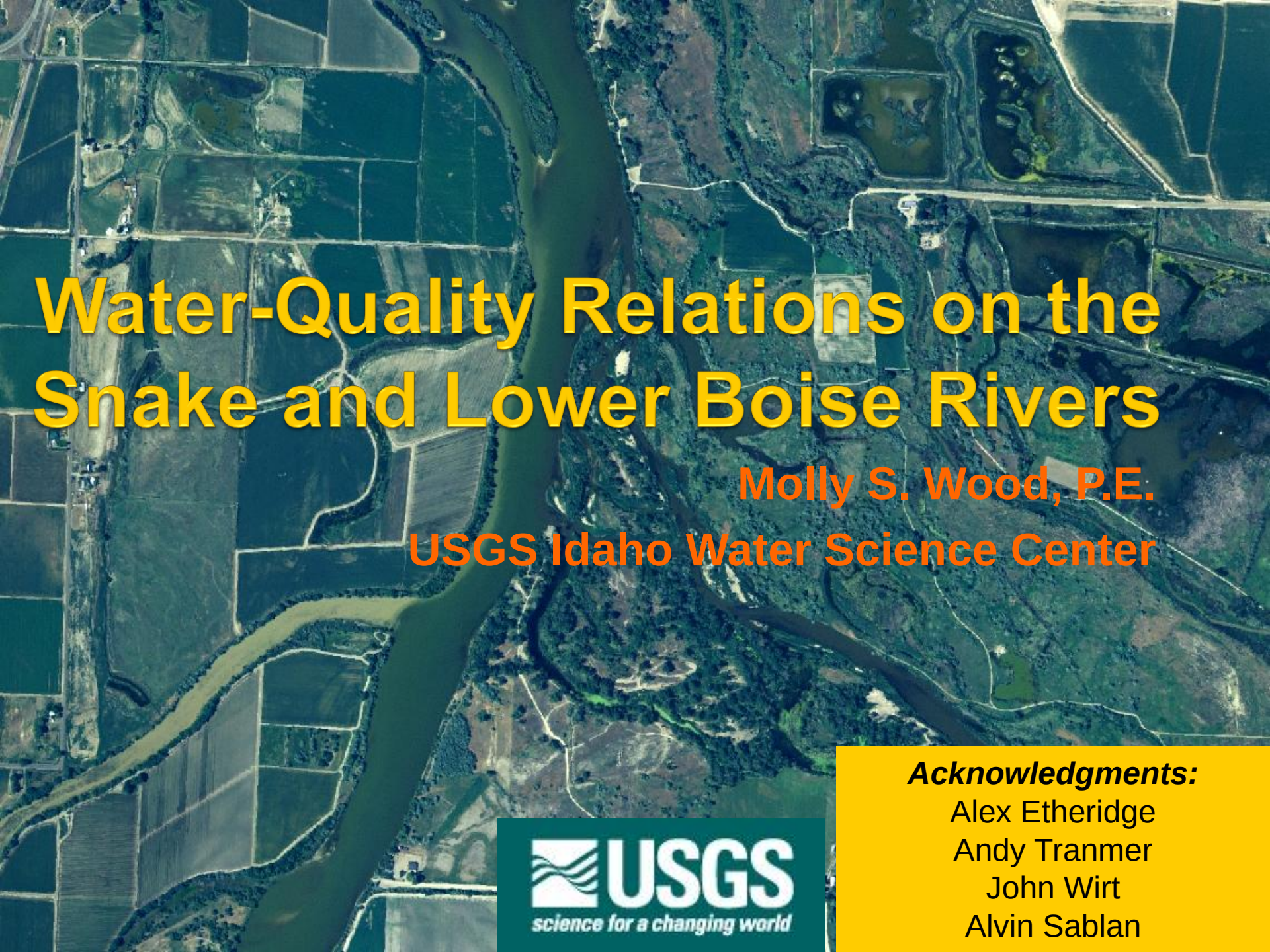

Water-Quality Relations on the Snake and Lower Boise Rivers

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USGS
science for a changing world

Acknowledgments:
Alex Etheridge
Andy Tranmer
John Wirt
Alvin Sablan

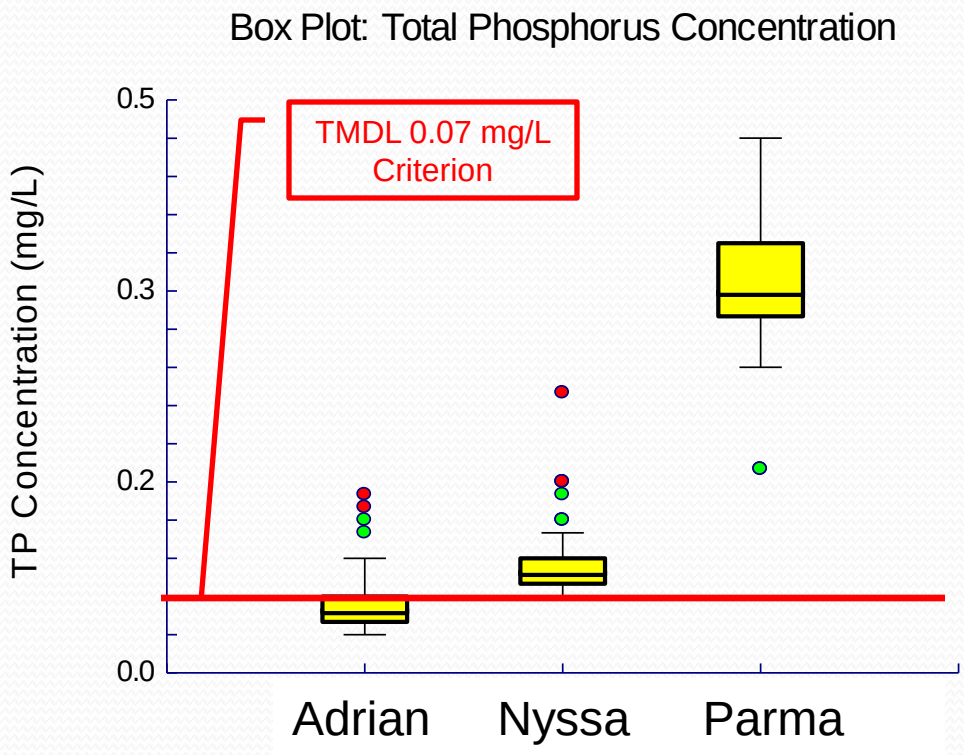
Overview

- Lower Boise River and on Snake River above/below confluence
- Started Fall 2008
- Continuous sondes: chlorophyll-a, DO, pH, temperature, specific conductance, turbidity
- Sampling: chlorophyll-a, TP, o-PO_4, TN, NH_3, NO_2+NO_3
- Sampling frequency:
  - Monthly, Oct-May
  - Biweekly, June
  - Weekly, July-Sept
- Autosampler on Boise River

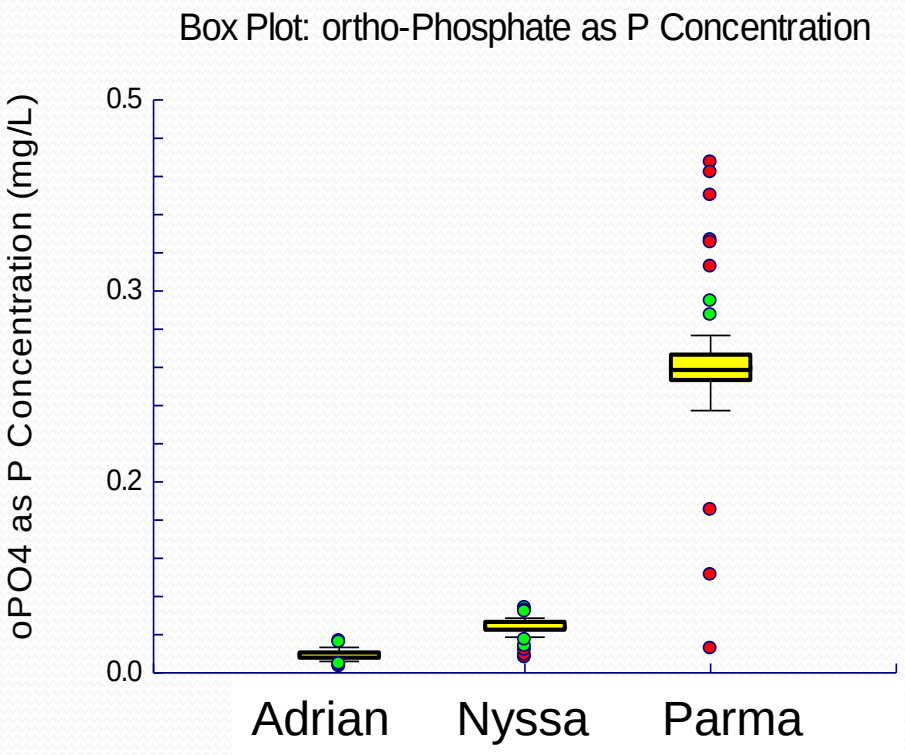

Idaho
Oregon
Nyssa
Parma
Adrian
Boise
Arrowrock Reservoir
Lake Lowell
Lake Owyhee
84
84
Willow Creek
Dry Gulch
Little Willow Creek
Big Willow Creek
Little Squaw Creek
Middle Fork Payette River
Payette River
Payette River
Bully Creek
Owyhee River
A Line Canal
Black Canyon Canal
Farmers Cooperative Ditch Canal
South Fork Willow Creek
Willow Creek
Dry Creek
Grimes Creek
Moran Creek
Owyhee River
Snake River
Low Line Canal
Phyllis Canal
Boise River
New York Canal
Tenmile Creek
Blacks Creek
Succor Creek
Jump Creek
Squaw Creek

NUTRIENTS

Phosphorus



TP



oPO_4

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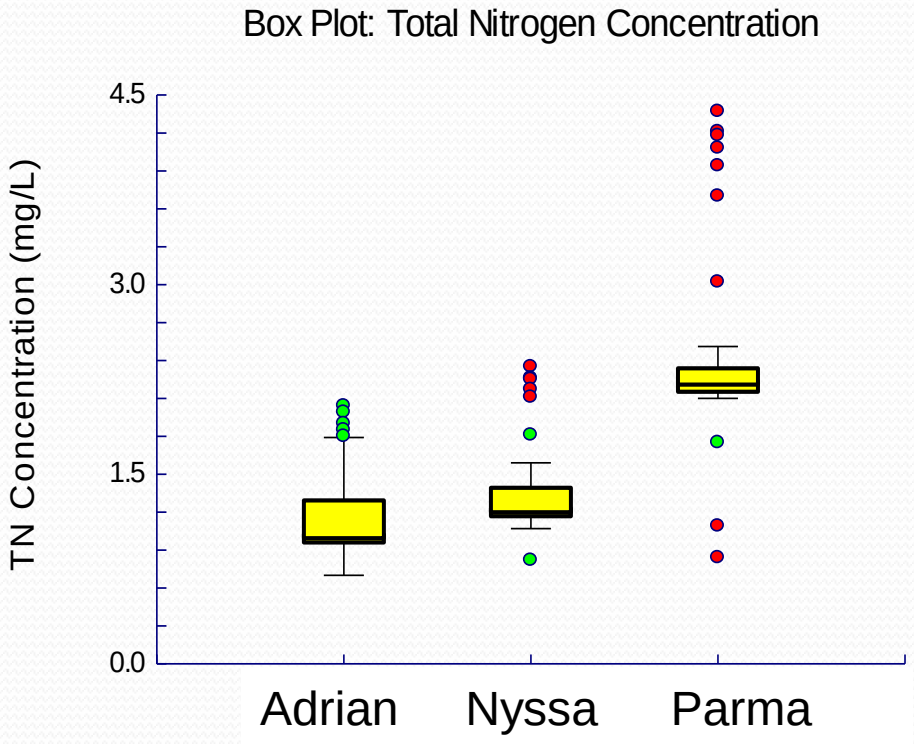
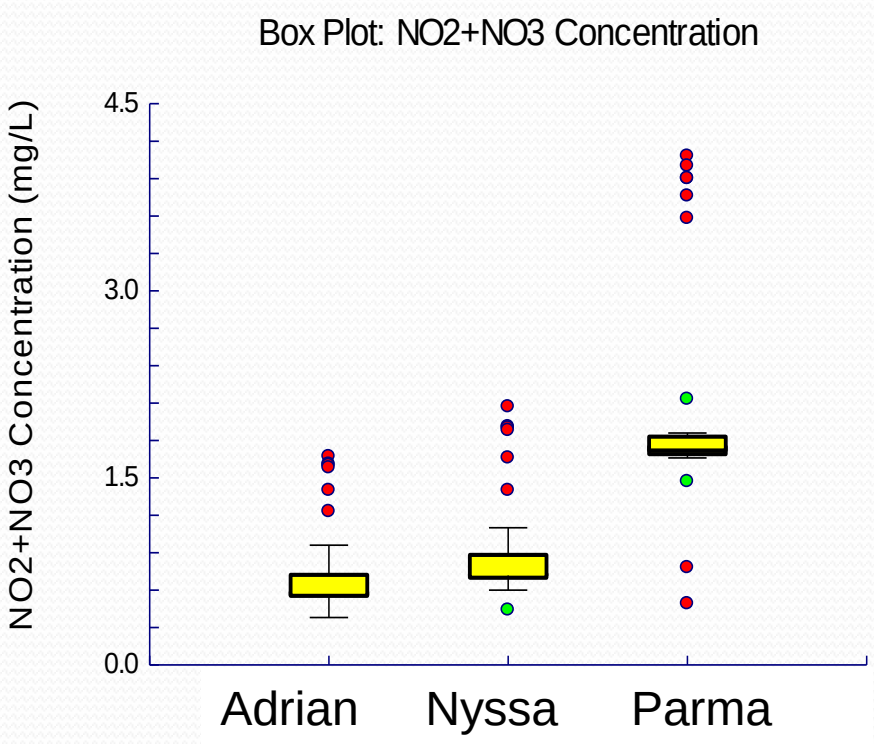
Nitrogen



TN



NO_2+NO_3

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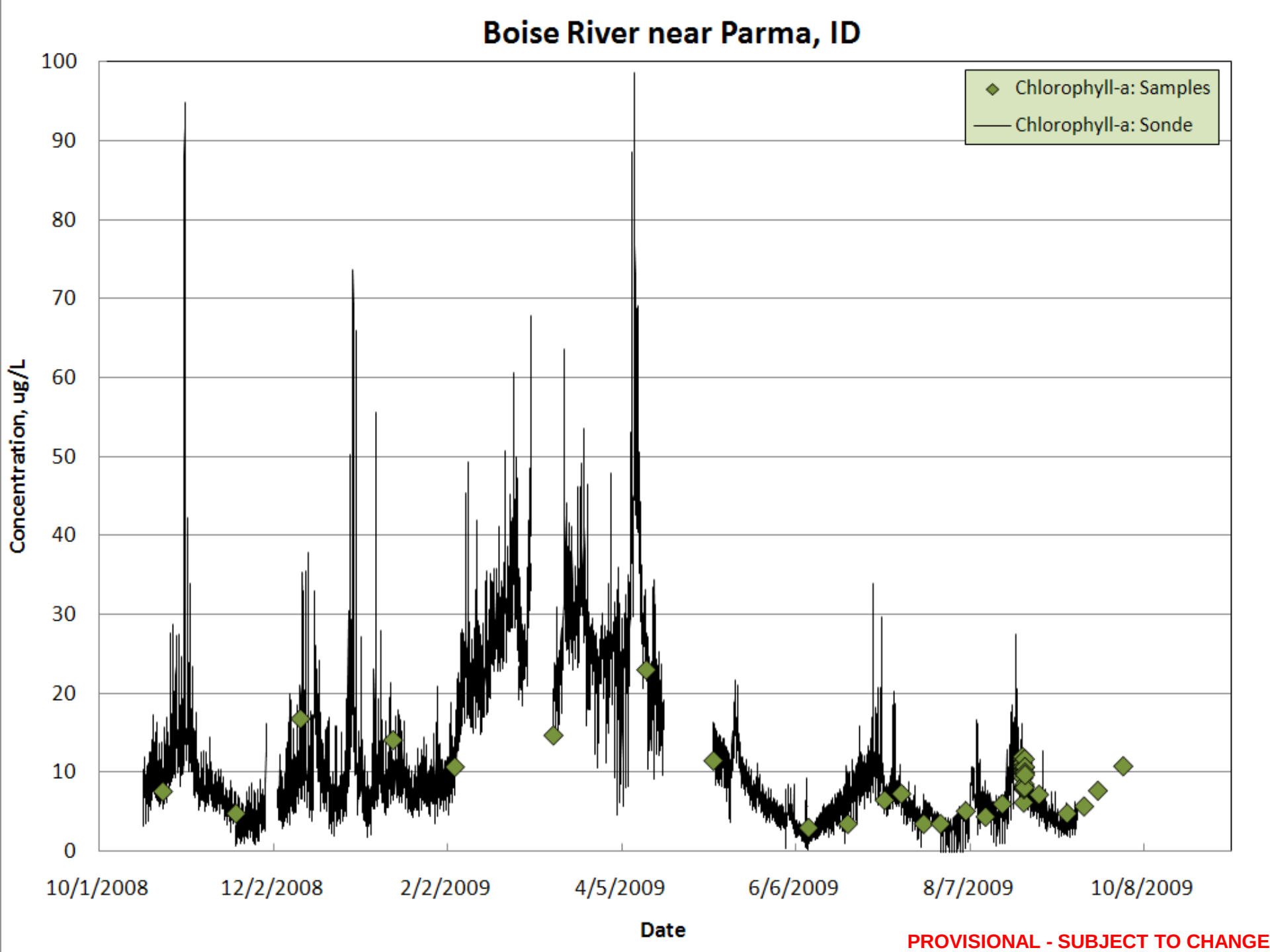
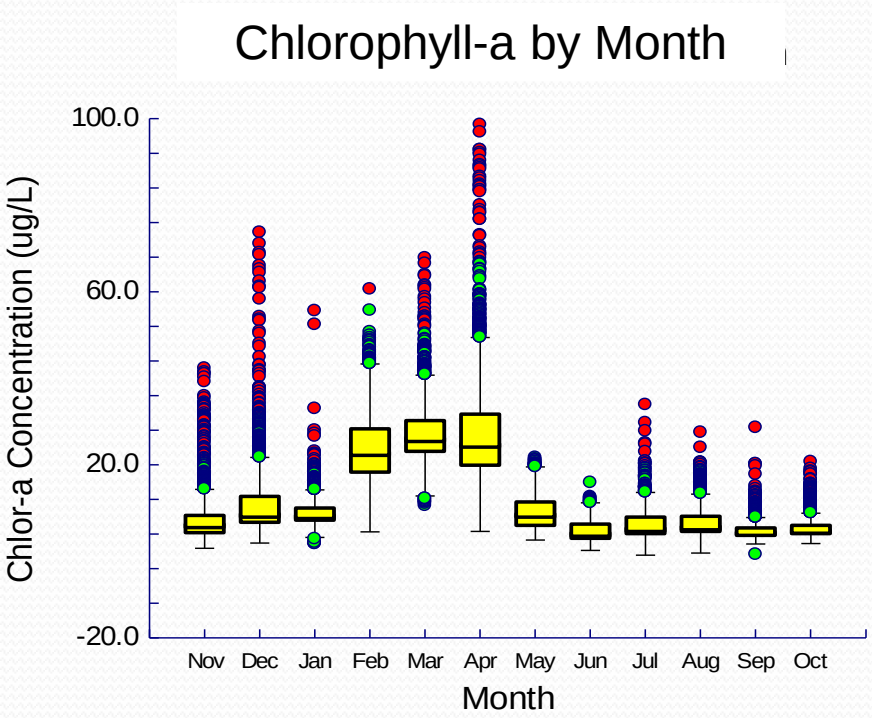
CHLOROPHYLL-A

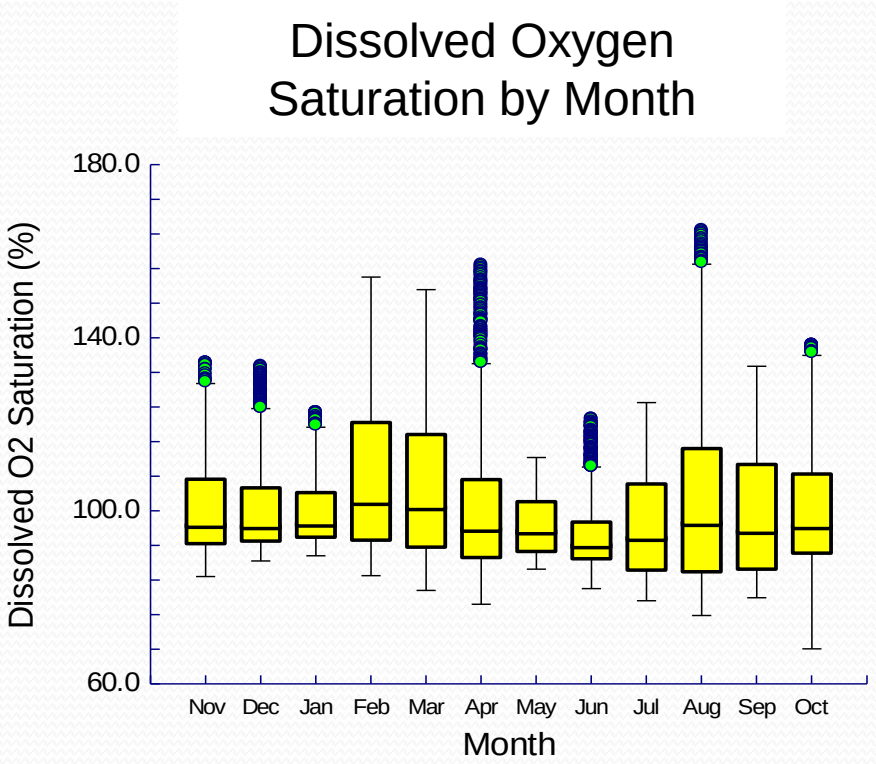
Chlorophyll-a

- High chlorophyll-a in winter: both sondes and samples
- Light availability
- Greatest deviations between “raw” sonde readings and samples in winter
  - Change in algal population?
    - Fluoresce differently
    - Other types of chlorophyll (b, c)
  - Production zones
- Catching fluctuations with sondes


Boise River near Parma, ID
Chlorophyll-a: Samples
Chlorophyll-a: Sonde
Concentration, ug/L
100
90
80
70
60
50
40
30
20
10
0
10/1/2008
12/2/2008
2/2/2009
4/5/2009
6/6/2009
8/7/2009
10/8/2009
Date
PROVISIONAL - SUBJECT TO CHANGE

Chlorophyll-a and DO at Parma





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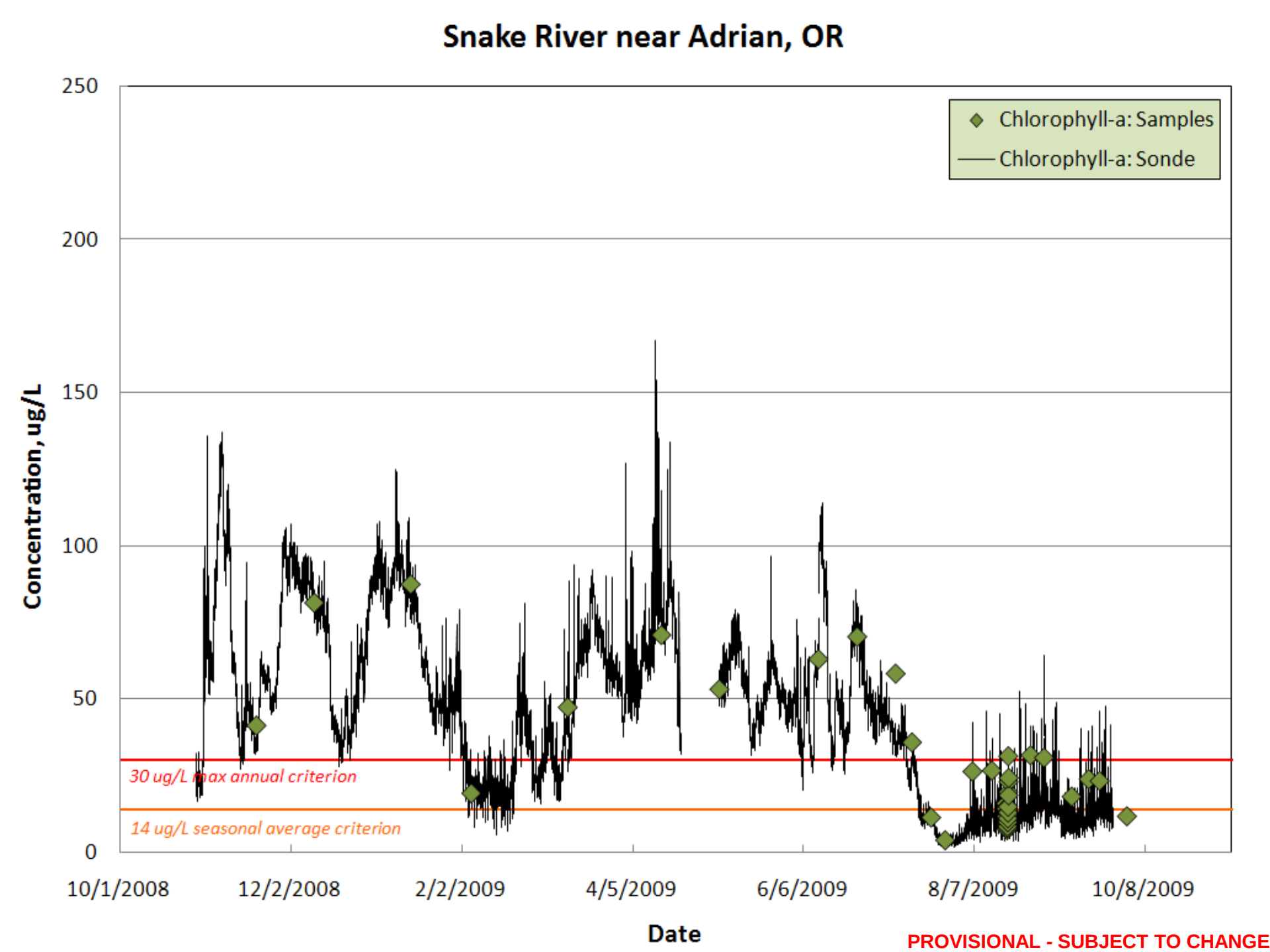
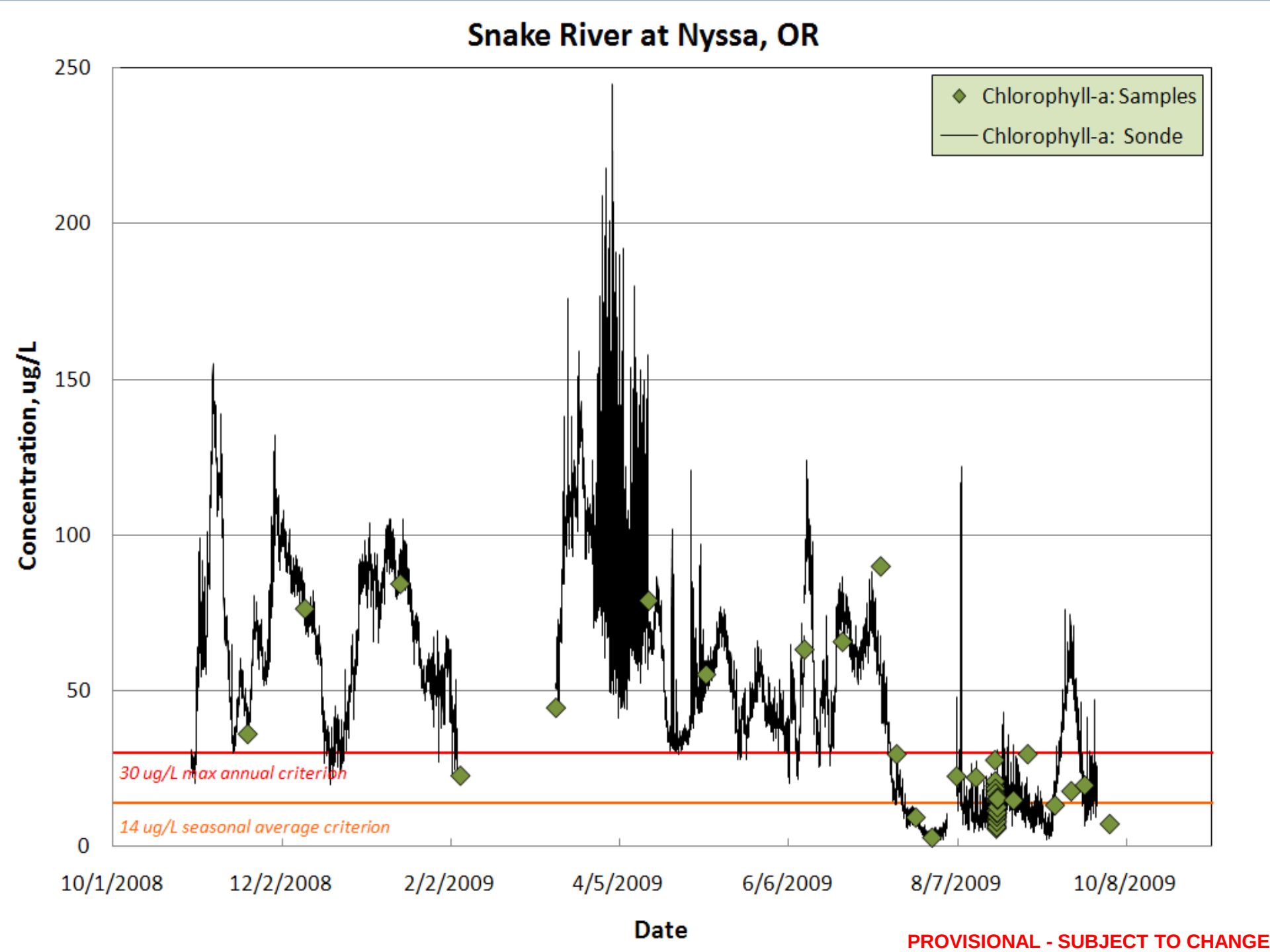

Snake River near Adrian, OR
Chlorophyll-a: Samples
Chlorophyll-a: Sonde
250
200
150
100
50
0
Concentration, ug/L
30 ug/L max annual criterion
14 ug/L seasonal average criterion
10/1/2008
12/2/2008
2/2/2009
4/5/2009
6/6/2009
8/7/2009
10/8/2009
Date
PROVISIONAL - SUBJECT TO CHANGE


Snake River at Nyssa, OR
Chlorophyll-a: Samples
Chlorophyll-a: Sonde
Concentration, ug/L
250
200
150
100
50
0
30 ug/L max annual criterion
14 ug/L seasonal average criterion
10/1/2008
12/2/2008
2/2/2009
4/5/2009
6/6/2009
8/7/2009
10/8/2009
Date
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OTHER COMPARISONS

Nutrients vs. Chlorophyll

- Likely rapid uptake of oPO_4 in Snake on annual basis
- Co-limitation in Boise; no clear relationship between nutrients and chlorophyll-a
- No clear relationship between NO_2+NO_3 and chlorophyll-a at any site on a seasonal or annual basis
- Diurnal and seasonal patterns: light availability may be a major driver for chlorophyll-a

Loads

- Similar trends at Adrian and Nyssa
- Increase in nutrient concentrations and loads between Adrian and Nyssa, but not all due to Boise River
- Boise River exports relatively little phytoplankton

Snake River: Adrian vs. Nyssa

Which Site is Statistically Higher (95% Confidence)?

Parameter	Snake nr Adrian	Snake @ Nyssa
TP		✓
oPO4		✓
TN		✓
NO2+NO3		✓
Chlorophyll-a (Sonde)		✓
Turbidity (Sonde)		✓
DO (Sonde)	✓	
pH (Sonde)	✓	
Specific Cond. (Sonde)	No difference	

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Further Studies Planned

- Phytoplankton taxonomy
- Suspended sediment sampling
- Light availability as a seasonal driver for algae
- Owyhee water quality and flow

Data Available to Public

4 Ways to Retrieve:

- Real-time on NWIS-Web (sonde and flow data)
  http://waterdata.usgs.gov/id/nwis/rt
- Sample data on NWIS-Web
  http://nwis.waterdata.usgs.gov/id/nwis/qwdata
- Data Grapher website (sonde data)
  http://id.water.usgs.gov/grapher/
- Contact us
  Molly Wood, mswood@usgs.gov, 208-387-1320

QUESTIONS?